Characteristics of Practices and Patients of Family Practitioners with a Low Volume of Attending at Birth

Technical Report

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Summary of "Characteristics of the Practices and Patients of Family Practitioners with a Low Volume of Attending at Birth"

By D. Johnson and Y. Jin

Purpose

To compare the obstetrical practices of family physicians in Alberta by volume of deliveries.

Approach

Using Alberta Health and Wellness administrative databases, all deliveries between April 1, 1997 to March 31, 2000 were examined. A low volume family physician was defined as participating in less than twenty-five deliveries per year. All other family physicians were defined to be high volume.

Key findings

The following are key findings of this study:

- About ten percent of all deliveries in Alberta are performed by low volume family practitioners.
- Of the 1,026 family physicians practicing in Alberta, 543 (fifty-three percent) were low volume providers.
- While the number of deliveries by all family practitioners was relatively constant (forty-four percent) during the three years, the percentage of deliveries by low volume family practitioners decreased during the three years of this study, accounting for less than four percent of all deliveries in the last study year (1999/00).
- Low volume family practitioners perform nearly one-half of deliveries and cesarean sections in those hospitals with the lowest volume (less than fifty deliveries per year).
- The number of deliveries in smaller hospitals (less than one hundred deliveries per year) was relatively constant (nine percent) over the three study years.
- Low volume family practitioners perform fewer medical inductions, vacuum extractions, epidural analgesia for vaginal deliveries, and more forcep extractions, episiotomies, and cesarean sections compared to high volume family practitioners.

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- Obstetricians tend to deliver higher risk mothers (age greater than forty years, maternal comorbidity, hypertension, first live birth) and newborns (breech presentations, low birth weight, small for gestational age, fetal comorbidity, Apgars less than seven).

Conclusions

We speculate that low volume family practitioners are being replaced by high volume family practitioners in smaller hospitals. The replacement of low volume family practitioners by high volume family practitioners may have been made easier by the similarity of delivering lower risk patients. The loss of low volume family practitioners would have potentially greater effect on rural and aboriginal mothers. The practice style of low volume family practitioners tended to be more invasive compared to high volume family physicians. Despite the recommendations of the Society of Obstetricians and Gynaecologists of Canada that low volume obstetrics is a viable practice choice, a low volume of obstetrical deliveries does not seem consistent with the evolving practices of family physicians.

For more information

Copies of the report are available from the **Alberta Centre for Health Services Utilization Research**

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Alberta Centre for Health Services Utilization Research

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SUMMARY

The number of attended births by low volume family practitioners was about eleven percent of all attended births by family practitioners in Alberta. This percentage of attended births by low volume family practitioners decreased during the three years of our study and accounted for about five percent of all family practitioner attended births in the last study year (1999/00). In contrast, the number of deliveries done by all family practitioners remained near constant at about forty-three percent during the three years. Despite the recommendations of the Society of Obstetricians and Gynaecologists of Canada that low volume obstetrics is a viable practice choice, a low volume of attended births does not seem consistent with the evolving practices of family practitioners. This practice change may be more pronounced at smaller hospitals where most low volume practice occurs. This study did not determine if low volume practitioners were providing "safe" care but rather by profiling low volume practitioners we defined the change in practice patterns of family practitioners providing obstetrical care.

INTRODUCTION

The Society of Obstetricians and Gynaecologists of Canada have taken the position that a physician is not required to participate in an absolute number of deliveries to maintain competence. However, it is recommended that those physicians with less than twenty-five attended births per year should be restricted to low risk obstetrical practice and require an update of skills every two or three years [1]. The Society of Obstetricians and Gynaecologists, College of Family Physicians of Canada, and Society of Rural Physicians also recommend that the standard of care for a low risk maternity patient should be the same in the smallest facility or tertiary care centre [2-4]. Given the high standard of expected care in the face of constrained resources, the number of rural and remote communities that offer obstetrical services has decreased over the last decade [5]. In effect, centralization by default rather than regionalization has occurred and local access to maternal care services in many remote and rural communities is restricted. The known practice profiles of those physicians providing low volume obstetrics derives from practices in a few rural hospitals [6-8]. In Canada, the literature relating practice profiles in larger geographic areas is dated [9]. In this study, administrative data was used to describe the practice profile for attended births by low volume Alberta physicians during a recent three-year period. This study did not determine if low volume practitioners are providing "safe" care but rather by profiling low volume practitioners we speculate upon the sustainability of low volume practice irrespective of the quality of that care.

METHODS

Four administrative health service databases were used:

- Canadian Institute for Health Information's (CIHI) Inpatient Discharge Abstract Database (DAD) for the province of Alberta for 1997/98 to 1999/00,
- Alberta Physician Claims Assessment System Database for 1997/98 to 1999/00,
- Alberta Vital Statistics Birth Database for 1997 to 1999, and
- Alberta Health Insurance Plan Registry File for 1997 to 2000.

All data was accessed through Alberta Health and Wellness. Maternal deliveries were identified using CIHI DAD. Of the births that occur in Alberta, over ninety-nine percent take place in acute care facilities. All separations for 1997/98, 1998/99 and 1999/00 with main patient service area 51 (obstetrics delivered) were extracted. Three years of data were combined because the volume of deliveries in some facilities is small. No stillbirths were included.

The use of forceps or vacuum for delivery (ICD-9-CM 72.0, 72.1, 72.2x, 72.3x, 72.4, 72.5x, 72.6, 72.71, 72.79, 73.3) and medical/surgical induction (ICD-9-CM 73.4, 73.01, 73.09) were extracted in any of the ten Canadian Institute for Health Information Discharge Abstract Database procedural codes fields [10,11]. Maternal reproductive comorbidity associated with pregnancy was defined as multiple pregnancy, malposition or malpresentation, abnormalities of cervix or uterus, and cephalopelvic disproportion (ICD-9-CM 651.x to 654.x in any of the 15 CIHI DAD diagnosis fields or as the Case Mix Grouper (CMG®) groupers 602, 603, 608, or 610 for previous caesarean sections).

Fetal co-existing diagnosis associated with pregnancy was defined as developmental problems, fetal placenta or uterine problem (ICD-9-CM 655.x to 658.x in any of the 15 CIHI DAD diagnosis fields and not a maternal comorbidity as defined above). Maternal hypertension comorbidity was defined as ICD-9-CM 401.x to 405.x and 642.x in any of the 15 CIHI DAD diagnosis fields.

To obtain neonatal data (sex, birth weight, date and time of birth), main patient service field 54 (newborn) was extracted and matched to each delivering mother. The registry database also identified those aboriginal women who are registered with Department of Indian Affairs and Northern Development (DIAND).

Vital statistic birth records contain questions to be completed by the attending physician or pediatrician and the mother. Vital statistics data from January 1, 2000 to March 31, 2000 were unavailable. Variables unique to vital statistics incorporated into this study were number of total maternal live births, breech or cephalic presentation, neonatal Apgar at five and ten minutes, and gestational weeks.

The anonymous maternal identifier for delivery hospital separations was used to identify specific physician billing records (Canadian Classification of Procedures [12] (CCPx)) code for these same mothers from physician claims database. These billing records included a range of anaesthesia services including epidural (CPX 16.91C) for obstetrical procedures, the role of the

provider (anaesthesia), and the specialty of the provider (general practice, anaesthesiologist).

Defining hospital volume and service region

Hospitals providing maternal delivery services were categorized into six groups on the basis of the average number of deliveries per year over the three year study period, metropolitan location, and level of newborn facilities: 1) twenty-nine small rural hospitals (1 to 49 deliveries per year); 2) thirteen medium rural hospitals (50 to 99 deliveries per year); 3) thirty-two large rural hospitals (100 to 405 deliveries per year); 4) five regional hospitals (631 to 1,691 deliveries per year) located in one of the five non-metropolitan regional health care cities; 5) five hospitals located in the metropolitan health regions of Calgary and Capital hospitals; 6) two hospitals containing level three neonatal intensive care units (one hospital in each metropolitan centre).

Defining low and high volume practitioners

Each assisted birth was ascribed to only one most responsible physician in order to obtain valid comparisons and identify non-duplicate deliveries. If more than one claim was submitted, the hierarchy of most responsible physician was obstetrician, general surgeon, and family practice. Each claim submitted was also credited as an assisted birth experience to the submitting physician for the purposes of volume determination even if more than one physician submitted a claim for the delivery. Thus, all participating physicians would be credited with an assisted birth experience even if they were not the most responsible physician. Low volume was defined as less than twenty-five assisted birth experiences per year and/or less than seventy-three in the three-year period. As physicians may have not provided obstetric services during the entire three-year period, the number of deliveries were prorated to the percentage of the three-year period that each physician submitted a claim (i.e. between the first and last service dates within the three years).

STATISTICS

Contrasts were made comparing high and low volume practitioners and comparing all family practitioners and obstetricians using chi square. Significance was defined at the 0.05 level.

RESULTS

We identified 107,426 deliveries from the physician claims database, which was ninety-six percent of total 111,789 deliveries extracted from CIHI DAD system. During the three year study period, 543 of 1,026 family practitioners (53 percent) were low volume providers whereas 6 (4 percent) of 135 obstetricians were determined to be low volume providers. Figure 1 illustrates the total number attended vaginal births by all family practitioners (low and high volume) for the years 1997/98, 1998/99, and 1999/00. The overall percentage (11 percent) of all (vaginal and cesarean section) family practice births attended by low volume family practitioners decreased from 24 percent to 9 percent to 5 percent in 1997/98, 1998/99 and 1999/00 respectively. In contrast the number of all births attended by all family practitioners was relatively constant (43 percent) during the three years. The median number of attended births during the study period for high volume family physicians was 80 (25 percent to 75 percent quartiles 3:134). The low percentile (25 percent) reflects both a short time period in which some physicians were considered to be participating in obstetrical practice within the three year study period and as well a high volume physician may have received credit for participating in an attended birth experience but not called the most responsible physician if another physician also participated. The median number of attended births during the study period for low volume family physicians was 23 (25 percent to 75 percent quartiles 9:42). The median number of attended births by high volume obstetricians was 626 (25 percent to 75 percent quartiles 118:1158).

Table 1 illustrates the distribution of physician specialities and hospital ranked by volume. As the hospital volume increases, the percentage of attended births and cesarean sections performed by obstetricians increase. General surgeons perform a small number of cesarean sections in smaller facilities but family physicians still perform the majority. The percentage of attended births and cesarean sections by low volume family practitioners decreases as hospital volume increases (Table 2). Low volume family practitioners attend nearly one-half of births and cesarean sections in those hospitals with the lower volume (less than fifty deliveries per year).

The patient characteristics of low and high volume family practitioners are described in Table 3. Low volume family practitioners attend the delivery of more aboriginal women registered with the DIAND and births of small for gestational age newborns; attend less first delivery mothers and births of newborns with fetal comorbidity. The patients characteristics of obstetricians and all family practitioners are significantly different with more

higher risk mothers (age greater than forty, greater comorbidity, hypertension) and newborns (breech presentations, low birth weight, small for gestational age, greater fetal comorbidity, Apgars less than seven). Obstetricians attend at more first live births. Low volume family physician practice is predominately rural while that of obstetricians is predominately urban.

The practice style of high and low volume family practitioners is described in Table 4. The rate of medical inductions, vacuum extractions, epidural analgesia for vaginal deliveries is lower and the rate for forcep extractions, episiotomies, and cesarean sections is higher comparing low to high volume family practitioners. A higher percentage of patients delivered by low volume family practitioners have no prenatal visit. The practice style of obstetricians is significantly more interventional (medical induction, forceps/vacuum extraction, cesarean sections) than family practitioners.

DISCUSSION

We speculate that lower volume family practitioners were replaced by high volume family practitioners in smaller hospitals. The replacement of low volume family practitioners by high volume family practitioners may have been made easier by the similarity of delivering lower risk patients. High volume family practice does not result in higher risk obstetrical practice. This underscores the recommendation that the presence of local obstetrical service by high volume family practitioners does not imply that all women deliver locally [13]. Although the rate of medical inductions, vacuum extractions, epidural analgesia for vaginal deliveries is lower and the rate for forcep extractions, episiotomies, and cesarean sections is higher comparing low to high volume family practitioners, these differences are much less than those comparing to obstetricians.

Low volume family practitioners may be forced to exit obstetrics because their hospital no longer provides the required resources. Hospitals may stop providing obstetrical services because of inadequate trained practitioners, equipment, or funding. Hospitals must be able to provide continuous obstetric resources that are only intermittently used [14]. Low volume hospitals in other provinces have chosen to stop providing obstetrical services [5]. The centralization (by default) of obstetrical services would likely affect low volume practitioners to a greater extent as they are more likely to practice in a low volume facility. The loss of smaller hospitals would have potentially greater affect rural and aboriginal women registered with DIAND. In Alberta, the decrease in low volume practice was not due to a general

decrease of deliveries in smaller hospitals (less than one hundred deliveries per year) which was relatively constant over the three years at nine percent.

Family practitioners may also exit obstetrics because of issues of competence. Low volume practitioners are challenged to provide a full range of maternal services including analgesia, newborn resuscitation, and sometimes cesarean sections. When offered the service, approximately thirty to fifty percent of mothers request epidural analgesia during labor [15]. Approximately ten percent of low risk deliveries will require newborn resuscitation [16]. However, the inability to provide the entire spectrum of obstetrical services has not been associated with worse outcomes. A Canadian survey in 1991 found that 125 of 576 hospitals provided maternity services without fulltime on site cesarean section capability [17]. Lack of cesarean section capability in northern British Columbia and rural New South Wales, New Zealand demonstrated no adverse perinatal outcomes attributable to lack of a cesarean section [16,18]. Ontario family practitioners who perform cesarean sections average only fifteen annually [19].

The relationship between volume and outcome for obstetrics contrasts to other medical conditions. Hospitals that perform a high volume of cancer surgeries have lower mortality than smaller volume centres [20-25]. Our designation between high and low volume obstetrical practice was obtained from a recommendation made by Society of Obstetricians and Gynaecologists of Canada. The cut-off of twenty-five is arbitrary and no evidence to suggest quality of care and volume are directly linked. The median number of attended births during a three year period for low and high volume obstetrics were relatively close (23 and 80) as opposed to a median of 626 for obstetricians. When birth weight and maternal risk are controlled, high obstetrical volume does not decrease perinatal mortality [26,27]. In one study, those physicians with five to twenty-two deliveries annually perform to expected norms [5]. Women from high outflow communities ("fewer than one third of deliveries to local women occurring in a local hospital") have a greater proportion of complicated deliveries, higher prematurity and higher costs of neonatal care than women in communities where most women are delivered locally [28]. The absence of a local physician in a rural community increases infant mortality [29]. Risk stratification and export of selected cases offers the promise of simultaneously maintaining local community services and improving perinatal mortality [30].

LIMITATIONS

Population-based administrative database research is highly generalizable although limited in clinical detail. We were able to verify deliveries comparing two independent databases. We are reliant on those completing other data fields for non-verifiable data. Family practice or specialist identification relates to Alberta College of Physician and Surgeons' classification. Family practitioners may have specialist training not recognized by the Alberta College of Physician and Surgeons. Low volume practitioners were defined as number of attended birth experiences between first and last claims. Physicians with only one claim within the study period had a time interval of zero and were not defined as low volume providers. This assumption may underestimate the number of low volume providers. We have no information upon physicians who may temporally move out of province and provide obstetrical services between the first and last Alberta claim dates. We have not provided information upon the course of newborn care.

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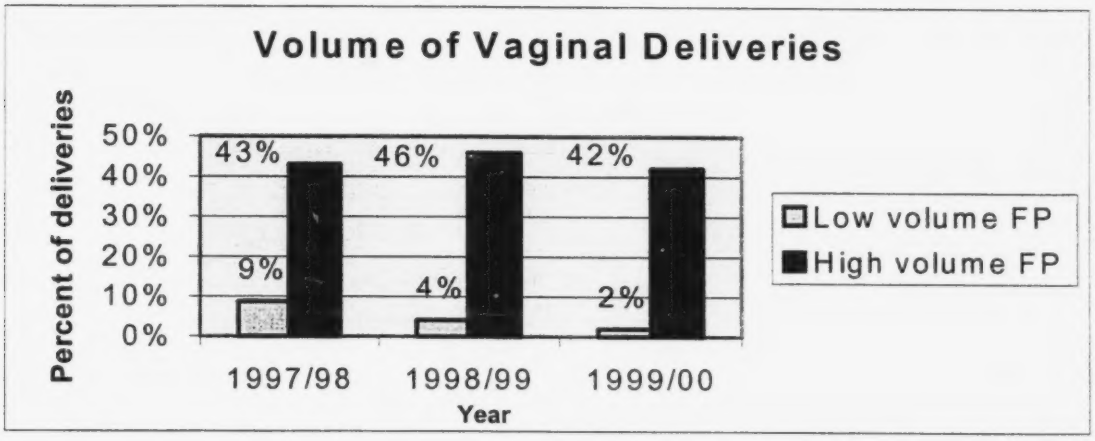
Figure 1: Volume of Vaginal Deliveries Performed by Low and High Volume Practitioners for 1997/98 to 1999/00



Where, FP is family practitioner.

Table 1: Distribution of hospitals by volume (vertical axis) and by route of birth and physician specialty (horizontal axis)

Hospital Groups	Vaginal Birth	Vaginal Birth	Vaginal Birth	Total	C/S	C/S	C/S	Total
(# of Deliveries):	FP	OBG	Other		FP	OBG	GS	
Small rural (< 50)	1,505 (91%)	151 (9%)	7 (0%)	1,663	42 (55%)	7 (9%)	28 (36%)	77
Medium rural (50 – 99)	2,111 (94%)	143 (6%)	0	2,254	328 (91%)	27 (8%)	5 (1%)	360
Large rural (100 – 405)	11,593 (86%)	1,810 (14%)	17 (0%)	13,420	1,530 (67%)	528 (23%)	240 (10%)	2,299
Regional (631 – 1,691)	6,764 (50%)	6,789 (50%)	12 (0%)	13,565	328 (10%)	2,828 (90%)	3 (0%)	3,159
Metropolitan (Calgary or Edmonton)	11,651 (32%)	24,957 (68%)	3 (0%)	36,611	120 (2%)	7,897 (98%)	5 (0%)	8,022
Metropolitan-NICU (Calgary or Edmonton)	4,341 (22%)	15,836 (78%)	3 (0%)	20,180	60 (1%)	4,801 (99%)	3 (0%)	4,865
Alberta	**37,967 (43%)**	**49,686 (57%)**	**42 (0%)**	**87,695**	**2,408 (13%)**	**16,088 (86%)**	**284 (1%)**	**18,782**

Where, FP is family practitioner, OBG is obstetrician, GS is general surgeon, and C/S is cesarean section. Level 3 refers to level 3 neonatal intensive care. Bracketed number is percentage of total. Note the predominance of family practitioners in smaller hospitals and predominance of specialist care in larger and metropolitan hospitals.

Table 2: Distribution of hospital by volume (vertical axis) and low and high volume family practitioners (horizontal axis)

Hospital Group	Births Attended	Births Attended	Total	Cesarean Sections	Cesarean Sections	Total
(# of Deliveries):	Low volume FP	High volume FP		Low Volume FP	High volume FP	
Small rural (< 50)	691 (46%)	814 (54%)	1,505	23 (55%)	19 (45%)	42
Medium rural (50 – 99)	445 (21%)	1,666 79%)	2,111	49 (15%)	279 (85%)	328
Large rural (100 – 405)	1,503 (13%)	10,090 (87%)	11,593	188 (12%)	1,342 (88%)	1,530
Regional (631 – 1,691)	408 (6%)	6,356 (94%)	6,794	17 (5%)	311 (95%)	328
Metropolitan (Calgary or Edmonton)	517 (4%)	11,134 (96%)	11,651	9 (8%)	111 (93%)	328
Metropolitan-NICU (Calgary or Edmonton)	203 (5%)	4,138 (95%)	4,341	6 (10%)	54 (90%)	60
Alberta	**3,767 (10%)**	**34,200 (90%)**	**37,967**	**292 (12%)**	**2,116 (88%)**	**2,408**

Where, FP is family practitioner. Bracketed number is percentage of total. Note the predominance of low volume family practice in smaller hospitals.

Table 3: Description of patient characteristics delivered by low and high volume family practitioners compared to obstetricians

Patient characteristics	Low volume FP		High volume FP		Obstetrician	
Maternal age greater than 40	0.8%	(34/4,206)	0.9%	(315/36,756)	2.5%+	(1,664/66,133)
Gestation < 32 weeks	2.2%	(82/3,692)	2.7%	(779/29,248)	8.8%+	(4,453/50,696)
Aboriginal treaty status	10.7% *	(394/3,696)	8.1%	(2,369/29,263)	5.6%+	(2,833/50,728)
Non Calgary/Edmonton hospital	82.5%*	(3,470/4,206)	58.0%	21,315/36,755)	18.9%+	(12,488/66,125)
Any maternal reproductive comorbidity	7.8%	(328/4,206)	7.9%	(2,910/36,755)	24.7%+	(16,301/66,125)
Maternal hypertensive comorbidity	2.2%	(92/4,206)	2.6%	(947/36,756)	5.5%+	(3,608/66,133)
First live maternal birth	32.6%*	(1,205/3,696)	38.0%	(11,141/29,263)	43.7%+	(22,163/50,728)
Breech presentation	0.7%	(26/3,696)	0.6%	(188/29,263)	4.7%+	(2,402/50,728)
Birth weight < 2,500 grams	2.1%	(78/3,695)	1.9%	(562/29,260)	6.7%+	(3,381/50,721)
Small for gestational age newborn	8.8%*	(324/3,696)	7.0%	(2,033/29,263)	8.7%+	(4,423/50,728)
Fetal comorbidity	11.6%*	(488/4,206)	17.4%	(6,402/36,755)	24.2%+	(16,020/66,125)
Apgar 5 min <7	2.1%	(77/3,696)	1.8%	(512/29,263)	2.2%+	(1,101/50,728)
Apgar 10 min <7	0.2%	(9/3,696)	0.4%	(119/29,263)	0.5%	(237/50,728)

+ denotes p < 0.05 comparing obstetrician to all family practitioners
* denotes p< 0.05 comparing low to high volume family practitioner
Where, FP is family practitioner. Bracketed numbers are index cases out of total population. Note similarities between low and high volume family practitioners (with exceptions) and general differences to obstetricians.

Table 4: Description of practice style in low and high volume family practitioners

Medical Intervention % of all deliveries	Low volume FP	High volume FP	Obstetricians
No prenatal visits	7.4%* (272/3,696)	3.9% (1,140/29,263)	2.6%+ (1,333/50,728)
Epidural analgesia for vaginal delivery	10.3%* (402/3,918)	19.6% (6,812/34,685)	42.3%+ (21,264/50,286)
Medical induction	10.9%* (457/4,206)	13.5% (4,948/36,755	21.1%+ (13,970/66,125)
Episiotomy for vaginal deliveries	19.2%* (752/3,912)	17.3% (6,006/34,642)	25.7% (12,869/50,042)
Forceps extraction for vaginal deliveries	2.4%* (94/3,912)	1.6% (554/34,642)	9.7%+ (4,871/50,042)
Vacuum extraction for vaginal deliveries	7.0%* (273/3,912)	10.1% (3,488/34,642)	15.1%+ (7,551/50,042)
Vaginal birth after Cesarean	2.1% (86/4,059)	2.4% (879/36,318)	4.9%+ (3,209/65,733)
Cesarean section	7.2%* (294/4,059)	5.8% (2,114/36,318)	24.5%+ (16,089/65,773)

+ denotes $p < 0.05$ comparing obstetrician to all family practitioners
* denotes $p < 0.05$ comparing low to high volume family practitioner
Where, FP is family practitioners. Bracketed numbers are index cases out of total population. Note similarities between low and high volume family practitioners (with exceptions) and general differences to obstetricians

APPENDIX

Table: Hospital size distribution of all practitioners who perform deliveries in Alberta

Service RHA	Vaginal births (%)	Vaginal births (%)	Total Number	C/S (%)	C/S (%)	C/S (%)	Total Number
	FP	OBG		FP	OBG	GS	
1	51	49	5,119	12	85	3	986
2	61	39	2,921	23	77		391
3	90	10	1,319	55	20	25	234
4	37	63	28,717	2	98		6,432
5	75	25	882	29	69	2	169
6	69	31	5,428	14	86		1,307
7	90	10	2,278	69	8	23	470
8	93	7	1,061	88	10	2	144
9	62	38	1,617	63	37		121
10	19	81	28,224	1	99		6,455
11	94	6	1,383	85	9	6	183
12	86	14	2,495	55	32	13	473
13	79	21	3,114	50	50		613
14	96	4	749	93	7		215
15	93	7	932	94	6		118
16	2	98	1,300	0	100		370
17	96	4	1,104	95	5		102
Alberta	**43**	**57**	**88,643**	**13**	**85**	**2**	**18,783**

Where, FP is family practitioner, OBG is obstetrician, GS is general surgeon, and C/S is cesarean section. Level 3 refers to level 3 neonatal intensive care.

Table: Distribution of low and high volume family practitioners by service health region

Service RHA	Low volume FP (%) of attended	High volume FP (%) of attended	Total number
1	11	89	2,712
2	7	93	1,865
3	27	73	1,309
4	3	97	10,776
5	31	69	705
6	20	80	3,944
7	14	86	2,371
8	20	80	1,115
9	18	82	1,079
10	8	92	5,400
11	16	84	1,453
12	11	89	2,403
13	7	93	2,756
14	14	86	915
15	9	91	981
16	45	55	22
17	4	96	1,155
Alberta	**10**	**90**	**40,961**

Where, FP is family practitioner.

BIOGRAPHIES

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As a physician, Dr. David Johnson's clinical practice is affected by the health care system. Dr. Johnson is interested in understanding and promoting the use of information in directing health policy formation and decision making by the managers of the health care system.

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